

1 **In the Claims**

2 Claims 1-41 were originally filed.

3 Claim 24 is amended.

4 Accordingly, claims 1-41 are pending.

5
6 **Clean Version Of The Pending Claims Under 37 C.F.R. § 1.121(c)(3):**

7 Claims 1-41 now pending, are submitted below in accordance with 37
8 C.F.R. §1.121(c)(3), which presents a clean version of the entire set of pending
9 claims.

10 1. A method comprising:

11 initiating a search for images based on at least one query keyword in a
12 query; and

13 identifying, during the search, first images having associated keywords that
14 match the query keyword and second images that contain low-level features
15 similar to those of the first images.

16
17 2. A method as recited in claim 1, further comprising ranking the first
18 and second images.

19
20 3. A method as recited in claim 1, further comprising presenting the
21 first and second images.

22
23 4. A method as recited in claim 1, further comprising:
24 presenting the first and second images to a user; and
25

1 monitoring feedback from the user as to which of the first and second
2 images are relevant to the query.

3
4 5. A method as recited in claim 1, further comprising:
5 presenting the first and second images to a user;
6 receiving feedback from the user as to whether the first and second images
7 are relevant to the query; and
8 learning how the first and second images are identified based on the
9 feedback from the user.

10
11 6. A method as recited in claim 1, further comprising:
12 presenting the first and second images to a user;
13 receiving feedback from the user as to which of the first and second images
14 are relevant to the query; and
15 refining the search to identify additional images that contain low-level
16 features similar to those of the images indicated by the user as being relevant to the
17 query.

18
19 7. A method as recited in claim 1, further comprising:
20 presenting the first and second images to a user;
21 receiving feedback from the user as to which of the first and second images
22 are relevant to the query; and
23 assigning a large weight to an association between the query keyword and
24 the images deemed relevant by the user.
25

1 8. A method as recited in claim 7, further comprising grouping the low-
2 level features of the images deemed relevant by the user.

3
4 9. A method as recited in claim 1, further comprising:
5 presenting the first and second images to a user;
6 receiving feedback from the user identifying an example image as less
7 relevant or irrelevant to the query for refinement of the search; and
8 assigning a small weight to an association between the query keyword and
9 the example image.

10
11 10. A method as recited in claim 9, further comprising identifying
12 additional images with low-level features similar to those of the example image.

13
14 11. A computer readable medium having computer-executable
15 instructions that, when executed on a processor, perform the method as recited in
16 claim 1.

17
18 12. A method comprising:
19 permitting entry of both keyword-based queries and content-based queries;
20 finding images using both semantic-based image retrieval and low-level
21 feature-based image retrieval;
22 presenting the images to a user so that the user can indicate whether the
23 images are relevant; and
24 conducting semantic-based relevance feedback and low-level feature-based
25 relevance feedback in an integrated fashion.

1
2 13. A method as recited in claim 12, further comprising ranking the
3 images.

4
5 14. A method as recited in claim 12, further comprising using images
6 indicated as being relevant to find additional images.

7
8 15. A computer readable medium having computer-executable
9 instructions that, when executed on a processor, perform the method as recited in
10 claim 12.

11
12 16. A method comprising:
13 associating keywords with images to form keyword-image links;
14 assigning weights to the keyword-image links;
15 presenting a result set of images obtained from an image retrieval search
16 based on a query;
17 receiving feedback from a user as to whether the images in the result set are
18 relevant to the query; and
19 modifying the weights according to the user feedback.

20
21 17. A method as recited in claim 16, wherein the modifying comprises
22 increasing the weight of a keyword-image link for images deemed by the user as
23 more relevant to the query.
24
25

1 18. A method as recited in claim 16, wherein the modifying comprises
2 decreasing the weight of a keyword-image link for images deemed by the user as
3 less relevant to the query.

4
5 19. A computer readable medium having computer-executable
6 instructions that, when executed on a processor, perform the method as recited in
7 claim 16.

8
9 20. A method comprising:
10 presenting a result set of images that are returned from an image retrieval
11 search of a query having at least one keyword;
12 monitoring feedback from a user as to whether the images in the result set
13 are relevant to the query;
14 in an event that the user selects at least one image as being relevant to the
15 query, associating the keyword in the query with the selected image to form a first
16 keyword-image association and assigning a comparatively large weight to the first
17 keyword-image association; and
18 in an event that the user identifies an example image for refinement of the
19 search, associating the keyword in the query with the example image to form a
20 second keyword-image association and assigning a comparatively small weight to
21 the second keyword-image association.

22
23 21. A method as recited in claim 20, further comprising conducting both
24 content-based image retrieval and semantic-based image retrieval.
25

1 22. A method as recited in claim 20, further comprising presenting the
2 result set of images in a user interface, the user interface facilitating the user
3 feedback by allowing the user to indicate which images are more relevant and
4 which images are less relevant.

5
6 23. A computer readable medium having computer-executable
7 instructions that, when executed on a processor, perform the method as recited in
8 claim 20.

9
10 24. **(Once Amended)** A method comprising:
11 computing, for each category, a representative feature vectors of a set of
12 existing images within the category;
13 determining a set of representative keywords that are associated with the
14 existing images in each category;
15 comparing, for each new image, the low-level feature vectors of the new
16 image to the representative feature vectors of the existing images in each category
17 to identify a closest matching category; and
18 labeling the new image with the set of representative keywords associated
19 with the closest matching category.

20
21 25. A method as recited in claim 24, further comprising using use
22 feedback to selectively add and/or remove keywords from the new image.

23
24 26. A method as recited in claim 24, further comprising:
25 placing the labeled new images into a holding category;

1 evaluating the labeled new images in the holding category to determine if
2 any of the keywords associated with the labeled new image match the
3 representative keywords from each category; and

4 assigning the labeled new image to the category that best matches the
5 keywords associated with the labeled new image.

6
7 **27.** An image retrieval system comprising:

8 a query handler to handle both keyword-based queries having one or more
9 search keywords and content-based queries having one or more low-level features
10 of an image; and

11 a feature and semantic matcher to identify at least one of (1) first images
12 having keywords that match the search keywords from a keyword-based query, and
13 (2) second images having low-level features similar to the low-level features of a
14 content-based query.

15
16 **28.** An image retrieval system as recited in claim 27, wherein the feature
17 and semantic matcher ranks the images.

18
19 **29.** An image retrieval system as recited in claim 27, wherein the query
20 handler comprises a natural language parser.

21
22 **30.** An image retrieval system as recited in claim 27, wherein the query
23 handler comprises:

24 a parser to parse text-based queries; and

25 a concept hierarchy to define various categories of images.

1
2 **31.** An image retrieval system as recited in claim 27, further comprising
3 a user interface to present the images identified by the feature and semantic
4 matcher.

5
6 **32.** An image retrieval system as recited in claim 27, further comprising:
7 a user interface to present the images identified by the feature and semantic
8 matcher to a user, the user interface allowing the user to indicate whether the
9 images are relevant to the query; and
10 a feedback analyzer to train the image retrieval system based on user
11 feedback as to relevancy.

12
13 **33.** An image retrieval system as recited in claim 27, further comprising:
14 a user interface to present the images identified by the feature and semantic
15 matcher to a user, the user interface allowing the user to identify an example
16 image; and
17 the feature and semantic matcher being configured to identify additional
18 images that contain low-level features similar to those of the example image.

19
20 **34.** An image retrieval system as recited in claim 27, further comprising:
21 a user interface to present the images identified by the feature and semantic
22 matcher to a user, the user interface allowing the user to identify which images are
23 relevant to a particular search query; and
24 a feedback analyzer to assign a large weight to an association between the
25 search keywords and the images identified as relevant by the user.

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2 **35.** An image retrieval system as recited in claim 34, wherein the
3 feedback analyzer groups the low-level features of the images identified as
4 relevant by the user.

5
6 **36.** An image retrieval system as recited in claim 27, further comprising:
7 a user interface to present the images identified by the feature and semantic
8 matcher to a user, the user interface allowing the user to identify an example image
9 as being less relevant or irrelevant to the query; and
10 a feedback analyzer to assign a small weight to an association between the
11 search keywords and the example image.

12
13 **37.** An image retrieval system as recited in claim 36, wherein the feature
14 and semantic matcher identifies additional images with low-level features similar
15 to those of the example image.

16
17 **38.** A database structure stored on one or more computer-readable media
18 comprising:

19 multiple image files,

20 multiple keywords, and

21 a semantic network to associate the keywords with the image files, the
22 semantic network defining individual keyword-image links that associate a
23 particular keyword with a particular image file, each keyword-image link having a
24 weight indicative of how relevant the particular keyword is to the particular image
25 file.

1
2 **39.** A computer-readable medium having computer-executable
3 instructions that, when executed, direct a computer to:

4 find images using both semantic-based image retrieval and low-level
5 feature-based image retrieval;

6 present the images to a user so that the user can indicate whether the images
7 are relevant; and

8 concurrently conduct semantic-based relevance feedback and low-level
9 feature-based relevance feedback.
10

11 **40.** A program as recited in claim 39, further comprising computer-
12 executable instructions that, when executed, direct a computer to rank the images.
13

14 **41.** An information retrieval program, embodied on the computer-
15 readable medium, comprising the computer-executable instructions of claim 39.
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